REMARKS

The application has been reviewed in light of the Office Action dated March 20, 2008. Claims 1-13 were pending. By this Amendment, new claims 14-17 have been added. Accordingly, claims 1-17 are now pending, with claims 1 and 17 being in independent form.

Claims 1-13 were rejected under 35 U.S.C. § 102(b) as purportedly anticipated by U.S. Patent No. 5,150,053 to Pauly et al.

This application relates to improvements devised by applicant for a magnetic resonance imaging (MRI) apparatus which enables excitation to be selectively applied to a local region without using an RF pulse for signal suppression. In an aspect of this application, RF irradiation is controlled so that the RF excitation pulse is simultaneously applied to each of a first coil and one or more additional coils such that a phase of a second half of a waveform of an output of the additional coil, after the temporal center of the RF excitation pulse, is different by 180° from a phase of the first half of the waveform. Such an apparatus can acquire a signal from the slice-selectively excited region by one time of measurement. Each of independent claims 1 and 17 addresses such features, as well as other features.

Pauly, as understood by applicant, proposes a magnetic resonance system for imaging species having short spin-spin relaxation times (T_2) wherein two excitations are applied in sequence with data acquisition occurring after the application of each excitation. The two excitations correspond to respective halves of a conventional slice-selective excitation, and the same acquisition gradients (as the conventional approach) are used for the half excitations. The data acquisition following each of the excitations are then added to provide a signal for the desired slice.

The Office Action equated the saddle coil 14 in Figure 1A of Pauly and also equated coils

26 of Figure 2 of Pauly with a first coil and one or more additional coils. Figures 1A and 2 are reproduced below.

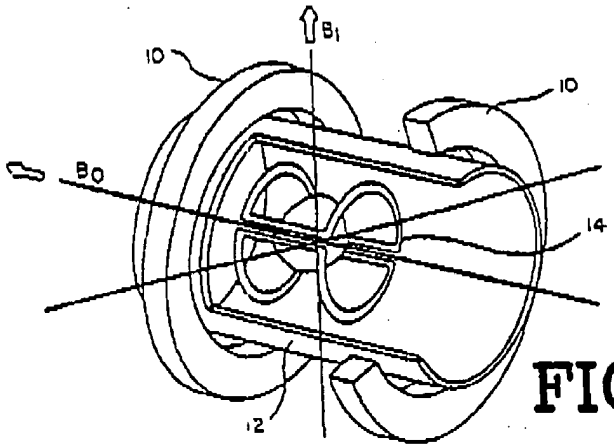


FIG.—1A

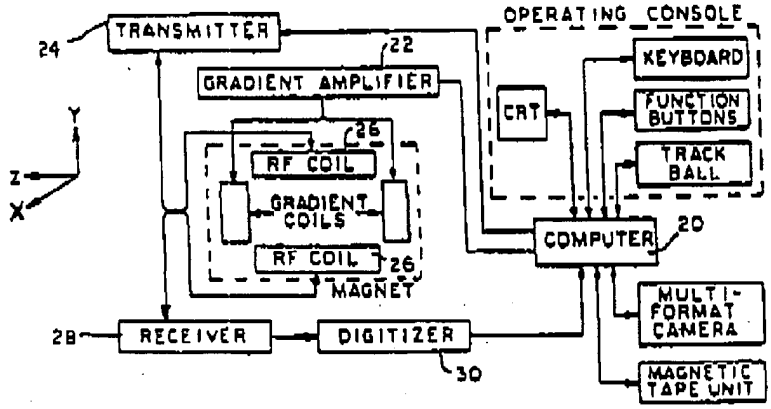


FIG.—2

Pauly, column 4, lines 15-18, points out that element 14 is a single saddle coil and that a patient undergoing imaging would be positioned along the Z axis within the saddle coil 14. Such a saddle coil is shown in the paper entitled "Saddle Coil for MRI" attached as Exhibit A hereto, and at a glance appears to be two coils, but actually consists of two portion joined together to form a single coil. Accordingly, Fig. 1A of Pauly does not disclose or suggest RF transmitting means including a first coil and one or more additional coils, for applying an RF excitation pulse

to a subject.

The coils 26 of Figure 2 is illustrated in two parts so as to coincide with the two parts (sandwiching the patient) of coil 14 of Figure 1 of Pauly. There is not any explanation in Pauly that the coils 26 in Figure 2 correspond to a first coil and one or more additional coils.

The gradient coils of Figures 1A and 2 of Pauly are also equated in the Office Action with RF transmitting means for applying an RF excitation pulse to a subject.

However, it is well understood in the art that gradient coils apply gradient magnetic field, and **NOT** an RF excitation pulse, to a subject placed in a static magnetic field.

Further, it is contended in the Office Action that Figure 5, 6a-6d, 8a-8c, 9a, 9b, 11a, and 11b of Pauly show an RF excitation waveform wherein a second half of a waveform of an output of at least one of said one or more additional coils, after the temporal center of the excitation pulse, is different by 180 degrees from a phase of the first half of the waveform, such that excitation is selectively applied only to a local region.

However, excitation 1 and 2 in Figure 5 (reproduced below) of Pauly show first half and second half slice-selective excitations, respectively.

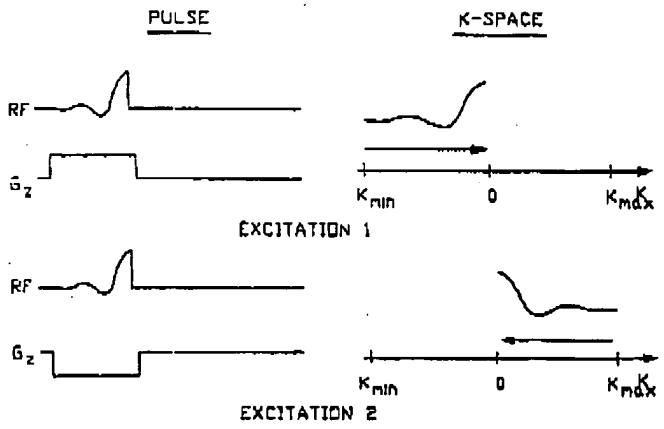


FIG.—5

Pauly, column, 5, lines 45-60, explains that the slice-selective excitation is separated in two parts as shown in Figure 5, wherein the first half excitation, as captioned Excitation 1 in Figure 5, includes the first half (that is, K_{min} to k-space origin) of the conventional excitation RF pulse with positive gradient Gz, the second half excitation, as captioned EXCITATION 2 in figure 5, includes time-reversed (that is, K_{max} to k-space origin) second half of the convention excitation RF pulse with negative gradient Gz, and the acquired signals from the two half excitations are added to make the added signal the same as that of the conventional slice-selective excitation.

It should be noted that the phase difference between the first half and the second half is not present in the excitation, but rather only in gradient Gz.

Further, Pauly does not disclose or suggest that the phases of the first and the second half of the excitation should be different from each other.

Pauly simply does not disclose or suggest (a) the RF transmitting means including a first coil and one or more additional coils, and (b) the RF excitation pulse whose second half of a waveform of an output of at least one of said one or more additional coils is different by 180 degrees from a phase of the first half of the waveform. The system proposed by Pauly cannot acquire a signal from the slice-selectively excited region by one time of measurement.

Accordingly, applicant respectfully submits that independent claims 1 and 17, and the claims depending therefrom, are patentable over the cited art.

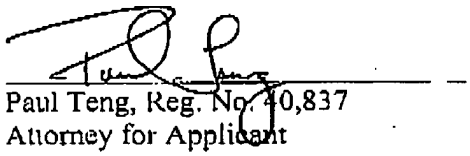
In view of the remarks hereinabove, applicant submits that the application is in condition for allowance, and earnestly solicits the allowance of the application.

If a petition for an extension of time is required to make this response timely, this paper should be considered to be such a petition. The Patent Office is hereby authorized to charge any

required fees, and to credit any overpayment, to our Deposit Account No. 03-3125.

If a telephone interview could advance the prosecution of this application, the Examiner is respectfully requested to call the undersigned attorney.

Respectfully submitted,



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